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(54) SILK STOCK CARBONIZATION-TREATED FINE PARTICLE POWDER AND SILK STOCK CARBONIZATION-TREATED PRODUCT AND THEIR PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain the subject particle powder or product, an industrial material usable as a raw material for coloring cosmetics and coating materials and the like, raw material for active carbon of high gas-absorbing power, or as an active carbon sheet, by carbonization treatment (followed by grinding) of sub-silk yarns virtually with no utility value at present, silk nonwoven fabrics being in application in the field or miscellaneous cosmetic goods alone, or silk stock as silk-hydrolyzed powder being in utilization mainly as food additive alone.

SOLUTION: This fine particle powder is obtained by the following process: silk stocks such as sub-silk yarns, silk nonwoven fabrics and/or silk powder produced by hydrolysis, are put into a baking oven at normal temperatures and humidity capable of vacuum atmosphere, kept in a vacuum condition, heated at 285-420°C for 10-120 min to carry out a carbonization treatment, then cooled to normal temperatures and ground with a grinder to a particle size of 1 to 90 µm. This powder retains silk protein without destruction of 13-20% nitrogen content inherent in the silk, namely, retains silk characteristics. The other objective silk stock carbonization-treated product is obtained by carbonization termagant of silk stocks such as the above under the same conditions mentioned above followed by cooling to normal temperatures.

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CLAIMS

[Claim(s)]

[Claim 1] Where the humidity based on an official moisture regain for a silk raw material is maintained, after storing in the firing furnace in which a vacuum is possible, maintain a vacua and it heats at 285 degrees C - 420 degrees C under a vacua for 10 minutes to 120 minutes. With the particle powder obtained by grinding so that it may cool to ordinary temperature and particle diameter may become 1 micron - 90 microns with a back grinder, after performing carbonization processing Silk coal-for-coke-making-ized processing particle powder characterized by having not destroyed the nitrogen content which silk protein is made to remain and silk has again, and 13% - 20%, namely, making the description of silk remain.

[Claim 2] The process which carries out management storing in the firing furnace in which a vacuum is possible where the humidity based on an official moisture regain for a silk raw material is maintained, The process which maintains the inside of the firing furnace at a vacua, performs heating carbonization processing for 10 minutes - 120 minutes at 285 degrees C - 420 degrees C under a vacua, and is continuously cooled to ordinary temperature, The manufacture approach of the silk coal-for-coke-making-ized processing particle powder characterized by consisting of the process which grinds a carbonization processing object to particle powder with a particle diameter of 1 micron - 90 microns with a grinder after that.

[Claim 3] Where the humidity based on an official moisture regain for a silk raw material is maintained, after storing in the firing furnace in which a vacuum is possible, maintain a vacua and it heats at 285 degrees C - 420 degrees C under a vacua for 10 minutes to 120 minutes. The silk coal-for-coke-making-ized processing object which do not destroy 13% - 20% of nitrogen content which it is obtained by performing carbonization processing, and silk protein is made to remain, and silk has again, namely, the description of silk is made to remain, and is characterized by **.

[Claim 4] The manufacture approach of the silk coal-for-coke-making-ized processing object characterized by to consist of a process which maintains at a vacua the inside of the process which carries out management storing, and its firing furnace at the firing furnace in which a vacuum is possible, performs heating carbonization processing for 10 minutes - 120 minutes at 285 degrees C - 420 degrees C under a vacua, and is continuously cooled to ordinary temperature where the humidity based on an official moisture regain for a silk raw material is maintained.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention -- various kinds of silk raw materials (an eliminated cocoon --), for example, the waste silk which utility value had conventionally The gray yarn waste which comes out of a silk manufacture weaving process, and the silk nonwoven fabric mainly used effectively only for the makeup miscellaneous-goods field, The silk powder which is almost used only for the field of a food additive and which was processed by hydrolysis It is the particle powder ground [processes on condition that predetermined, carbonizes and] and obtained, and they are the silk coal-for-coke-making-ized processing particle powder which can be used for cosmetics, a coating, and the raw material and activated carbon sheet of activated carbon, and an object concerning those manufacture approaches to a silk coal-for-coke-making-ized processing object list.

[0002]

[Description of the Prior Art] Silk is more nearly mainly used as textiles from ancient times, and is warmly kind to the skin lightly. Do not bar human being's skin respiration, but help the temperature humidity control of the skin, and it excels in moistness. While being used as a raw material of the clothing which had **** and a high-class feeling and had the property in which excelled in color enhancement and a dermopathy was not started There is little utility value (an eliminated cocoon, gray yarn waste which comes out of a silk manufacture weaving process), such as waste silk. A **** nonwoven fabric hardly circulates in a commercial scene, but even if metaphor use is carried out, only the direction of most particle use as a food additive of the silk powder which was mainly restricted to the field of makeup miscellaneous goods, and was processed by hydrolysis is found out.

[0003]

[Problem(s) to be Solved by the Invention] Although the silk powder into which little waste silk etc. and the silk (eliminated cocoon, gray yarn waste which comes out of silk manufacture weaving process) nonwoven fabric of utility value were processed by some makeup miscellaneous goods and hydrolysis is above almost used effectively only for one field by use of the food additive of a particle, respectively but all are having various deployments inquired, it is not yet enough.

[0004] the protein which silk has -- the various amino acid which constitutes it It consists of a leucine, the isoleucine, a valine, a FENIRU alanine, a lysine, etc. The essential amino acid which human being needs, a leucine, an isoleucine, a valine, A FENIRU alanine, a lysine, etc. are the same and are almost the same as that of the protein which constitutes human being's skin. By offering the silk coal-for-coke-making-ized particle powder which 13% - 20% of nitrogen content which these amino acid that does not do damage to the skin is made to remain, and silk has again was not destroyed [powder], namely, made the description of silk remain The **** raw material which becomes available as a raw material of cosmetics as an ingredient more near the skin is porosity as the special feature which it bore and had. The description of [acquiring a new color tone, if the property is not lost but it uses for a coating even if it has the property of a triangular cross section, and carbonizes and processes it into particle powder is also assumed, and] the same porosity, Even if adsorption energy compares with which fiber, it excels most, and the function as activated carbon and activated carbon which was excellent in the adsorption function as compared with conventional coconut shell activated charcoal etc. even if used as an activated carbon sheet is expected from a carbonization silk raw material.

[0005] This invention offers the carbonization silk raw material [waste silk / with little utility value] with which the engine performance is not fully used (an eliminated cocoon, gray yarn waste which comes out of a silk manufacture weaving process) and which utilized effectively the powder of a silk nonwoven fabric and the silk currently produced by hydrolysis, fully utilizing the property which these silk raw materials originally have.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the silk coal-for-coke-making-ized processing particle powder of this invention a silk raw material A vacua is maintained after storing in the firing furnace in which a vacuum is possible with the humidity which maintained the official moisture regain. With the particle powder obtained by grinding so that it may cool to ordinary temperature and may become the particle diameter of 1 micron - 90 microns with an after grinder, after heating for [10 minutes -] 120 minutes and performing carbonization processing at 285 degrees C - 420 degrees C under a vacua 13% - 20% of nitrogen content which silk protein is made to remain and silk has again was not destroyed, namely, the description of silk is employed efficiently.

[0007] When temperature and time amount are set up identically and calcinated in an inert atmosphere, a silk nonwoven fabric comes apart, and cannot be used as an activated carbon sheet, without stopping the original form, namely, the aesthetic property and the gloss which silk has, bulkiness, etc. are destroyed altogether.

[0008] a silk raw material, the so-called waste silk, etc. and a silk (eliminated cocoon, gray yarn waste which comes out of silk manufacture weaving process) nonwoven fabric and the silk powder manufactured by hydrolysis -- usually -- 20 degrees C -- a weight ratio -- about 12% of moisture (official moisture regain) is included, and the conditions of carbonization are improved more by carbonizing under a vacuum again, without spoiling the special feature which silk had, aesthetic property, and gloss.

[0009] Under the vacuum which needs to design extent (extent of coloring of a silk raw material) of carbonization for a silk raw material according to an application, and sets up burning temperature and firing time in an experiment according to this [that original black will not be obtained if a silk raw material exceeds 420 degrees C at which sufficient carbonization does not advance even if it carries out heating baking below 285 degrees C, and] By carrying out a temperature setup at 285 degrees C - 420 degrees C which disassembly of silk protein advances quickly rapidly and cannot leave silk protein If it becomes possible not to destroy 13% - 20% of nitrogen content which the protein of silk is made to remain and silk has again, namely, to make the description of silk remain and 420 degrees C is exceeded Rapidly, silk protein will be destroyed, therefore by making the protein of silk remain, the description of silk is also useful and a silk coal-for-coke-making ghost becomes possible [holding gloss aesthetic property, gloss, and bulkiness]. Moreover, the particle with particle diameter smaller than 1 micron becomes high too much in respect of a manufacturing cost, its need decreases in the field of the invention, and if larger than 90 microns, the gloss of a cosmetics raw material and the silk raw material which the touch and a paint front face become coarse and is expected when using as a coating raw material, and gloss ** will not be obtained.

[0010] The matter used as a black raw material of current cosmetics It is the black carbon ***** matter mainly manufactured considering petroleum or natural gas as a raw material. To the silk coal-for-coke-making ghost obtained by using the opposite side silk raw material with which the benzpyrene known as a carcinogen is contained, and calcinating under a vacuum This silk coal-for-coke-making ghost by which no benzpyrene was detected in the value of PPM, without doing damage to the skin The raw material of cosmetics which gave grace to the skin, omitted ultraviolet rays, and the protein of the silk which can protect the skin was made to remain, and used the **** coal-for-coke-making-ized baking object The activated carbon and the activated carbon sheet which are used at present and which left the property of the protein of silk similarly and carried out carbonization baking of the silk raw material, and the raw material of a coating are this time, and are not used in the industrial world.

[0011] The manufacture approach of silk coal-for-coke-making-ized processing particle powder according to claim 2 It is possible to maintain the humidity based on an official moisture regain for a silk raw material, and the process stored in the firing furnace in which **** and a vacuum are possible, and the inside of the firing furnace are maintained at a vacua. Under a vacua The process which heats for [10 minutes -] 120 minutes, performs carbonization processing, and is continuously cooled to ordinary

temperature at 285 degrees C - 420 degrees C, This manufacture approach of having the process which grinds that carbide to particle powder with a particle diameter of 1 micron - 90 microns with a grinder after that is the the best for adjusting the silk coal-for-coke-making-ized processing particle powder of claim 1.

[0012] The process which a silk coal-for-coke-making-ized processing object according to claim 3 maintains the humidity based on an official moisture regain for a silk raw material, and is stored in the firing furnace in which a vacuum is possible, At the process which makes the firing furnace a vacua, heats for [for / 10 minutes / -] 120 minutes at 285 degrees C - 420 degrees C, continues performing carbonization processing under a vacua, and is cooled to ordinary temperature That is [it left the description silk protein of the silk raw material obtained, and 13% - 20% of nitrogen content which the silk raw material has], it is the silk coal-for-coke-making-ized processing object which made the description of silk remain.

[0013] This silk coal-for-coke-making-ized processing object is carbonized black with remnants in the nitrogen content which the property, silk protein, and silk of a silk raw material originally have for the purpose of being used for activated carbon, an activated carbon sheet, a black coloring agent, etc. By maintaining the humidity based on an official moisture regain, under a vacuum Black carbonization can be made more perfect, without breaking down the description which silk has, aesthetic property, gloss, etc. about temperature and time amount This product designed by experiment according to extent (extent of coloring of a silk raw material) of target carbonization, i.e., the aesthetic property of silk carbide, gloss, bulkiness, gloss, etc. remains as it is, or is ground and corned and is used as activated carbon. When remaining as it is and using it, the configuration of a silk raw material, for example, the configuration of a silk nonwoven fabric, is left behind as it is, and it can use as a sheet of activated carbon. Grinding with extent For example, when [which it can fabricate spherically and can obtain the big activated carbon of an adsorption side] this carbonization processing object is pulverized further, various black is obtained with extent of carbonization, and it can use as black coloring agents (cosmetics, coating, etc.) of various aesthetic property, such as some of glosses, some of gloss, and some of feeling of slipping.

[0014] The manufacture approach of a silk coal-for-coke-making-ized processing object according to claim 4 is the optimal as the manufacture approach of the carbonization processing object of a silk raw material according to claim 3 of maintaining the humidity based on an official moisture regain for a silk raw material, and having the process stored in the firing furnace in which a vacuum is possible, and the process cooled in ordinary temperature after maintaining the firing furnace at a vacuum, heating for [for / 10 minutes / -] 120 minutes and performing carbonization processing at 285 degrees C - 420 degrees C.

[0015]

[Embodiment of the Invention] Hereafter the silk raw material which explains the gestalt of the manufacture approach operation to the silk coal-for-coke-making-ized processing particle powder in connection with this invention, and a silk coal-for-coke-making-ized processing object list and which is a raw material of this invention first Like future, it is waste silk, etc. the powder of a silk (eliminated cocoon, gray yarn waste which comes out of silk manufacture weaving process) nonwoven fabric, and the hydrolyzed silk, etc., China is the main country of origins, the present condition is that the deployment is seldom progressing, and it can obtain cheaply.

[0016] It is desirable to carry out draft processing by the well-known approach , and to remove the impurity currently mix , when it is going to obtain silk carbonization processing particle powder with more high purity although the above-mentioned silk raw material does not have the need of pretreat specially , and , as for the silk ingredient which also hydrolyzes the silk powder make from hydrolysis , it is desirable to use the silk ingredient which is not mix an impurity as much as possible .

[0017] The vacuum firing furnace used for carbonization processing prepares an oil tank in a vacuum furnace, and becomes possible [cooling the silk raw material which is in a furnace (i.e., a baking object)] to ordinary temperature within the limits of time amount predetermined by oil cooling with the desirable firing furnace which can carry out oil cooling.

[0018] The baking procedure of obtaining the black silk carbonization processing particle powder used as ingredients, such as a makeup agent raw material and a raw material for coatings ** The inside of ** firing furnace which stores the silk raw material of the specified quantity in a firing furnace The oil tank

in a ** predetermined after [time amount progress] furnace which carries out the temperature up of the inside of a furnace after checking that the inside of ** firing furnace which checks that it is ordinary temperature normal relative humidity, and which maintains the inside of ** firing furnace at a vacua is a vacua to temperature predetermined at a predetermined rate to ordinary temperature After cooling at the rate of predetermined, as a grinder which grinds the carbonization processing object with a pulverizer according to ** need which takes out a silk carbonization processing object For example, micro jet pulverizer form MJ-7-4U by Hosokawa Micron [CORP.] CORP. and the classifier form super separator MSS are used and ground. It is obtained when the black silk carbonization processing object similarly used for a black makeup agent raw material, the raw material for coatings, activated carbon, etc. also manages severely the above-mentioned conditions (the inside of a furnace is temperature and time amount at ordinary temperature normal relative humidity).

[0019]

[Example 1] the particle size of about 1mm which hydrolyzed silk when it was going to obtain the about 5-micron pitch-black particle used as a cosmetics raw material, if silk powder use is carried out In order to avoid foreign matter mixing so that silk powder may not float in a vacuum furnace and after checking that the inside of a furnace is ordinary temperature normal relative humidity first The occasion which puts 10kg in the saccate thing of 100% of silk fibres, and is stored in it in the vacuum firing furnace of the volume of 3 1m, The inside of a furnace is maintained at a vacua, whenever [furnace temperature] is set as 350 degrees C, and after raising whenever [furnace temperature] and calcinating it for 65 minutes to 350 degrees C in 20 minutes, an oil tank is used for whenever [furnace temperature]. In 10 minutes If it cools to ordinary temperature, a silk raw material can pulverize this which can be taken out as a pitch-black carbonization processing object with the above-mentioned micro jet pulverizer, can obtain an about 5-micron pitch-black particle, and can use it as a cosmetics raw material and a coating raw material.

[0020]

[Example 2] In the example of an example 1, the dark-red particle was obtained by heating for 30 minutes at 300 degrees C by the vacua. It is used as various cosmetics raw materials.

[0021]

[Example 3] When carrying out carbonization processing, the silk nonwoven fabric used as an activated carbon sheet For example, if the silk nonwoven fabric of 30m of 75g presidents of a university of m2 superintendent officers is used, in order to take and remove the paper tube of a silk nonwoven fabric original fabric first, After folding up an original fabric in the shape of a sheet, removing a paper tube and checking that the inside of a furnace is ordinary temperature normal relative humidity, If whenever [furnace temperature] is cooled to ordinary temperature in 15 minutes using an oil tank after [which is stored in the vacuum firing furnace of the volume of 3 1m] maintaining the inside of a furnace subsequently to a vacua, setting whenever [furnace temperature] as 385 degrees C, raising whenever [furnace temperature] in 30 minutes and calcinating for 30 minutes this activated carbon sheet that a silk nonwoven fabric can maintain the aesthetic property of silk, and can be mostly taken out as a carbonization processing object with a pattern is carbonized with the triangular cross section and porosity held which since silk cloth for painting has -- having -- in addition -- and adsorbent [by carbonization] improves further and it is used as an outstanding activated carbon sheet.

[0022]

[Effect of the Invention] Those manufacture approaches express the following effectiveness to the silk coal-for-coke-making-ized processing particle powder of this invention, and a silk coal-for-coke-making-ized processing object list so that clearly from having explained above.

[0023] Silk coal-for-coke-making-ized processing particle powder according to claim 1 Carbonize a silk raw material, and predetermined aesthetic property, gloss, bulkiness, gloss, and a feeling of slipping are given and ground. Since 13% - 20% of nitrogen content which is utilized as cosmetics and raw materials, such as a coating, and which the special feature of silk protein remains as a raw material of cosmetics, and silk originally has again is not destroyed, Namely, since [that it is **** in antibacterial / which can be used as a very useful raw material since desiccation of the skin is prevented and ultraviolet rays are omitted again / which silk produces for which and has further /, without being kind to the skin and starting a dermatopathy since the description of silk is employed efficiently] it cannot divide, It can also become a raw material as a coating with antibacterial.

[0024] The manufacture approach of silk coal-for-coke-making-ized processing particle powder according to claim 2 is the procedure of producing efficiently silk coal-for-coke-making-ized processing particle powder according to claim 1.

[0025] A silk coal-for-coke-making-ized processing object according to claim 3 is leaving the chemical description of a silk fibre, and the structural description, and performing carbonization processing. When the function as an activated carbon raw material is large and uses a silk nonwoven fabric as a raw material, the ground thing which becomes available [the three-dimensional structure] as it is It is used for filtration of alcohols, such as Biel, purification of water quality, the impurity remover of a cleaning solution, etc. as an activated carbon raw material by being formed granular.

[0026] The manufacture approach of a silk coal-for-coke-making-ized processing object according to claim 4 indicates the procedure suitable for production of a silk coal-for-coke-making-ized processing object according to claim 3.

[0027] The analysis result of the silk powder by which carbonization processing was carried out below in this example for reference is shown in Table 1 (the nitrogen content of silk is 13% - 20% originally). Nitrogen content of the end activated carbon of a silk protein powder Place ** ** Affair Moisture regain Nitrogen content (%)

Sample A Vacuum firing 285 degrees C 20 minutes 6.37 16.29 Sample B Vacuum firing 345 degrees C 30 minutes.8.25 14.42 Sample C Vacuum firing 385 degrees C 60 minutes 12.58 17.22 [the schematic diagram shown typically]

[Translation done.]